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Original Article

EFFICACY OF TENS Vs PNF IN RELIEVING ACUTE CERVICAL OSTEOARTHRITIC PAIN

RAJANI CARTOR M[1] & PRASANNA DEVI G B[2]

[1]*Professor, Department of Orthopaedics VAPMS college of Physiotherapy, Visakhapatnam, Andhra Pradesh, India*

[2] *Physiotherapist, Apollo Hospital, Visakhapatnam, Andhra Pradesh, India*

ABSTRACT

BACK GROUND & PURPOSE

CERVICAL OSTEOARTHRITIS

It is a degenerative state, which involves changes in bones, discs and joints of the neck. With age, discs of the cervical spine slowly breakdown, loose fluid and joints that turn into rigid. The incidence of cervical osteoarthritis is high in people who carry heavy weights on their shoulder, dancers, gymnasts, and with repeated occupational trauma.

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)

It's a easy, non-invasive modality. TENS has gained popularity since 1970 in treating acute and chronic pain. The procedure of action of TENS is "ANALGESIC", generated by modulation of nociceptive input in dorsal horn of spinal cord byperipheral electric stimulation of high, sensory afferent nerves i.e.., by GATE-CONTROL THEORY OF PAIN.

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF)

It is a non-invasive method of treatment. Among all the techniques contract-relax and hold relax are often employed in health centres to alleviate suffer and to improve the span of movement. Among stabilising techniques, Stabilising reversal method is most commonly employed to increase muscle strength. Stretching technique used to improve muscle elasticity and also found to be positive effects on range of motions of both active and passive is PNF. It's more appropriate for painful conditions to have low forceful contractions. PNF works on 4 theoretical mechanisms.

- ***Autogenic Inhibition***
- ***Reciprocal Inhibition***
- ***Stress Relaxation &***
- ***Gate Control Theory***

The motto of the research is to know an effectiveness of the TENS & PNF in relieving suffer in patients with acute cervical osteoarthritic pain.

KEYWORDS: Cervical Osteoarthritis, Transcutaneous Electrical Nerve Stimulation & Proprioceptive Neuromuscular Facilitation

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INTRODUCTION

Objective of the study

The primary objective of the present research is to find

- Whether TENS is effective in relieving acute cervical osteoarthritic pain.
- Whether PNF is effective in relieving acute cervical osteoarthritic pain.
- Whether TENS is more effective than PNF in relieving acute cervical osteoarthritic pain.
- Whether PNF is more effective than TENS in relieving acute cervical osteoarthritic pain.

Inclusion Criteria

- Age: 25-55 years
- Gender: both
- With or without headache
- Neck pain
- Acute cases (below 3months)

Exclusion Criteria

- Infection
- Malignancy
- Chronic cases
- Osteoporosis
- Cardiac pacemakers
- Congenital deformities/ developmental disorders
- Osteophyte formation
- PIVD
- History of trauma
- History of surgery
- Spondylolisthesis
- Ankylosing Spondylosis
- Rheumatoid arthritis
- Acquired spine defects

MATERIAL & METHODOLOGY

Material

TENS Modality, Couch, Chair, Towel.

Methodology

Selected patients have been divided into two groups, Group A is given TENS Treatment and Group B is given PNF treatment

Parameters

Based on the selection criteria, 30 patients have been taken, and then split into two groups. Group A, was given TENS for 15-20minutes in each session (5days/week) and therapy have been provided for a duration of two weeks and Group B was

given PNF therapy for 10-15minutes for two weeks (5days/week). Both the groups were given standard treatment i.e.., Thermotherapy and Neck Isometric exercises. The subjects INTENSITY of suffer were calculated by using Visual Analogue Scale (VAS). Rating on the scale is noted as pre-test and post-test for observing the prognosis of the subject for two weeks i.e., for 10days. Patients are advised to not to take any medication for pain.

CERVICAL OSTEO ARTHRITIS

The term cervical osteoarthritis is also known as cervical spondylosis which is described as a chronic degenerative lesion of multiple or single cervical intervertebral discs and the consequent osteophyte formation on related vertebral bodies, which had become leading cause of musculo-skeletal disability in human beings.[1]

The clinical syndrome of cervical pain, cervical radiculopathy and cervical myelopathy is a sequence of disc degeneration.[2] The disease is multifactorial. Advancement of age, occupational heavy loading, trauma, whole body vibration etc are possible risk factors.[3,4] Smoking and genetic factors also contributes to the structural changes in spine.[5-7]. The Cervical Spine which is also referred as Neck region takes most of the compressive forces because of repeated or sustained movements of neck in their activities of daily living[8].

Most common degenerative change are seen in C5-C6, followed by C6-C7 & C4-C5.[9] Pain usually responds to activity modification, neck immobilisation, isometric exercises and medication. Cervical radiculopathy often responds favourably to conservative management but if there is persistence of pain or progressive neurological deficits, then surgery should be attempted through anterior or posterior cervical spine. Degenerative changes in cervical region are proof on radiographic test which describes the section of usual physiologic ageing practices.

Cervical spondylotic myelopathy is however a serious disabling condition[10]. Because of this growth of their society as well as the shift of the conditions, individual with signs of cervical spondylosis (CS) are often experienced in spinal exercise as well as for now, the icidence of cervical spondylosis is greater than previously.[11]

Postural muscles have a propensity to obtain reduced, hypertonus, spasmodic and modified proprioceptive input. Therefore usual effect of neck pain is muscular stiffness in both standards and pathological states. Majority usual muscle is upper trapezius and levator scapulae[12]. The literature in the bio-mechanical standpoint the reduction of this physiological lordosis might be a potential reason for the neck pain due to muscle variance [13] structural disfigurement as a result of structural overburden of the anterior portion of the spine[14] there's a variety of therapy choices employed to deal with neck pain[15] as an instance, heat and massage manipulation, and cervical traction and source of cervical collar due to musculo skeletal disorders. One of these, TENS is extensively utilized.

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION

TENS is a simple, non invasive modality from physiotherapythat is most frequently utilized to restrain both acute and chronic pain arising out of many forms[16]. TENS has been intiated to clinical exercise in 1972 as a adjunct to alternative pain remedies. The technique of this measures of this TENS is still not entirely perceived. Analgesia could be generated by the modulation of nociceptive input indorsal horn of the spinal cord by peripheral electrical stimulation of high sensory afferent nerves. This is actually the **GATE-CONTROL THEORY** of all pain[15]. Many researches investigated the effectiveness of TENS in musculoskeletal disorders are issued. Since the1970s, TENS has attained fame utilized as a method of acute and chronic pain[17]. TENS now is among the most often employed electrotherapy for generating painrelief.

Clinical researches is present in using TENS for various kinds of pain disorders like less back pain[18], Myofascial[19], along with arthritic pain[20], sympathetically mediated pain, bladder incontinence, neurogenic pain, visceral pain and post surgical pain, and chronic musculoskeletal pain[21]. The highest benefit is a non-invasive and non-toxic type of pain control, which can be founded, inpart, in the Gate Control Theory of Pain[22]. It's thw idea to initiate the great diameter, myelinated A-beta fibers with a less thresold for electrical stimulation[23]

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION

Neck pain is a usual difficulty, 60% to 90% of individuals in their middle age find a fault about it[24]. Many researchers cited neck pain as a second following lower back pain because the most popular musculoskeletal pain[25]. In accordance with **Carpenter** this difficulty concerns more than one in five people[24]. Definite non-invasive techniques like Proprioceptive Neuromuscular Facilitation (PNF), Stretching treatment, massage therapy, and taping treatment are outlined to be productive at relieving suffer and recovering functional skills.

Proprioceptive neuromuscular facilitation (PNF) is one of the therapeutic exercises which may help to improve the function of the muscles and tendons by reviving the proprioceptive sense, which increases muscle strength, flexibility and balance. It is frequently used in therapeutic exercises as a progressive resistance for functional training, improve limited ranges and to strength. Hold- relax method, often being administrated in health centres, is used to lessen pain, and to grow the ROM of joints. The stabilising alteration method is employed to develop the power of the trunk postural muscles, shoulder & pelvic girdle muscles and the relevant joints stability.

Visual Analogue Scale (VAS) of season intensity and affective magnitude were verified as ratio scale calculations for both chronic and investigational pain. So, the objective of the current research is to examine the efficacy betweenTENS and PNF in reducing cervical osteoarthritic pain by using VAS scale as outcome measure.

STUDY PROCEDURE

Subjects were collected from VAPMS COLLEGE OF PHYSIOTHERAPY OUTPATIENT Department and from 11 OUTPATIENT Department of KING GEORGE HOSPITAL, Visakhapatnam. 30 patients who gave their consent form were included in this study. 30 subjects were split into two groups as, Group A and Group B. Group A was given TENS therapy and Group B was given PNF therapy. Along with standard treatment i.e., thermotherapy and neck isometric exercises. Both the groups were assessed for their pain intensity by using the Visual Analog Scale, on the first day of the treatment as well on the 10th day of treatment (by the completion of 2weeks). Both the group patients were advised not to take analgesics.

Group-A: Transcutaneous Electrical Nerve Stimulation (TENS)

15 subjects in this group will be given transcutaneous electrical nerve stimulation.

i. e. TENS, stimulates nerves via and through the skin. It is a non-invasive tool to assist with pain relief.

TENS UNIT – HMS **INDOTENS** is the machine used in the study– it has two independent output channels with a facility of frequency pulse width and burst frequency controls which generates suffer relieving electrical pulses. Either single or dual channel with self-adhesive electrodes are put in to skin and affixed to TENS unit via lead wires. Electrical pulses which are modified are processed from the TENS unit, to act on the superficial and spinal nerves travelling across the brain.

Table 1

Mode Strong low rate (acupuncture-like)	**Pulse rate** Pre-set 2-4Hz	**Pulse width** Pre-set 150-200µs	**Amplitude** Slowly activate 1channel at a time and increase to highest tolerable level producing rhythmic muscle contractions	**Re-adjustment** Comfort can be increased by use of modulation

Placement of Electrodes

Electrode placement in case of cervical osteoarthritic pain – MOST TENDER AREA

Duration

Treatment duration - 15min-20mins/ 1 session/Day & Frequency - 4-8 Hz & Intensity – according to patient's tolerance and it should not be unpleasant. For every week results are to be noted. Treatment is given for 2weeks (5 days/week).

Group- B: Proprioceptive Neuromuscular Facilitation(PNF)

Treatment duration – 10mins-15mins/1 session/Day Treatment is given for 2 weeks Combination contract relax and hold relax are given to decrease pain along with PNF patterns.

PNF: PNF helps to develop strength, flexibility, coordination and functional mobility. Primary goal of the treatment is to facilitate the subject in gaining a posture or movement. To improve daily life activities, stretches as well as diagonals and rational patterned exercises are used.

Techniques of PNF

- **STRENGTHENING –**
  - Rhythmic initiation
  - Repeated contractions
  - Slow reversals
  - Rhythmic stabilisation
- **STRETCHING –**
  - Contract relax
  - Hold relax

PNF Stretching

It is often a combination of passive stretching and isometric contractions

- Encourages flexibility and co-ordination
- Increases ROM
- Better biomechanics, reduces fatique, and helps to prevent overuse injuries

Contract Relax

Body part is moved passively into the pattern of agonistby the therapist. While the subject is instructed to push against the resistance actively, with the antagonist isotonic contraction. This can be applied, when ROM is limited by muscle tightness.

Hold Relax

This starts with isometric contration of the antagonist against resistance and continued further by concentric contraction of the agonist muscle.

PNF Patterns

Each pattern has 3 dimension. Movement occur in a straight line, in diagonal direction with a rotatory component.

- Flexion / Extension
- Abduction / Adduction
- Rotation

Procedure

Patients were instructed to sit on the bed with their feet positioned wodth aside and place their hands on the knees to start with the intervention.

Neck Flexion PNF Pattern

The therapist stood behind the patient onto the right side and placed the tip of her right finger under the sufferers chin. Then the therapist placed her left hand on top of the patients head slightly on the left side in a diagonal direction. Therapist slightly pulled the chin so that it was lifted and causing the neck to extend. Commands are given in simple, accurate and easier way to understand, such as “pull your chin in” and “look at yur left hip”. Resistance was given against left rotation, flexion and lateral flexion along with the traction to the patients chin.

Neck Extension PNF Pattern

The therapist standing behind the right side of the patient, her right thumb is to be placed on the right side of the patients chin. Later therapist places her left hand on top of the patients head slighlty on the right side in a diagonal direction. Then the therapist slightly pulls the chin to flex the neck, rotate the head and tilt it to left. Proper and simple commands such as “lift your chin” and then “lift your head to look above” were given to the patient. Passive resistance was offered to right rotation, extension and lateral flexion.

Dosage of Exercises

Each of the above mentioned PNF patterns were performed 10 times of 3 sets once a day for a period of 2 weeks (5days/week)

DATA PRESENTATION

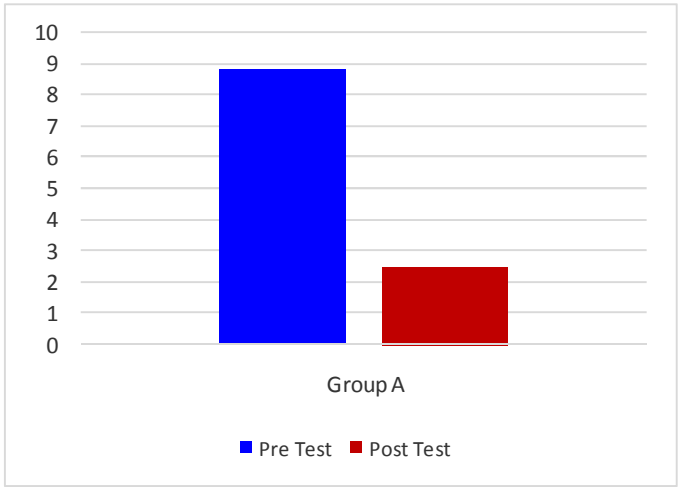

Figure 1: Paired 't' Test : VAS For Group-A: Pre and Post Mean (TENS).

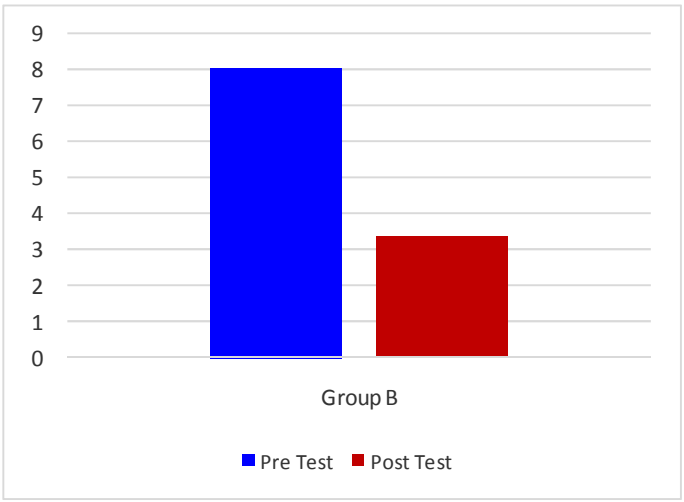

Figure 2: VAS for Group B: Pre and Post Mean (PNF).

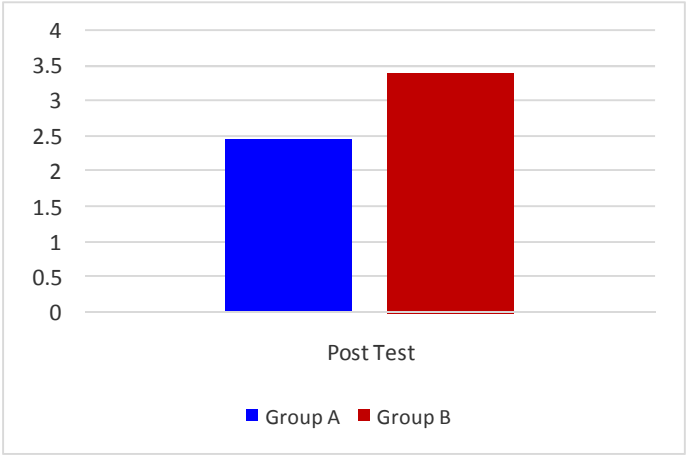

Figure 3: VAS Mean between Group A and Group B Post Treatments.

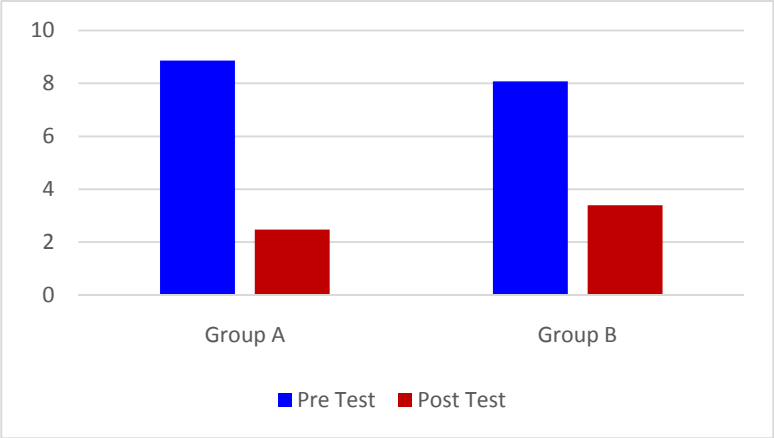

Figure 4: Pre and Post Test Analysis.

RESULTS

Table 2

		Experimental values	At	Table values	
T_{14}	Paired for A	19.39	0.05	2.15	Highly significant, showing TENS is effective. Null hypothesis rejected
T_{14}	Paired for B	9.628	0.05	2.15	Highly significant, showing PNF is effective. Null hypothesis rejected
T_{28}	Unpaired A & B	2.4874	0.05	2.05	Significant, null hypothesis rejected and alternate hypothesis accepted showing that TENS is more effective in relieving acute cervical osteoarthritic pain.

Results are showing that there is an effect of TENS and PNF in relieving acute cervical osteoarthritic pain. But when compared to PNF, it is prooved that TENS is more effective in relieving acute cervical osteoarthritic pain.

CONCLUSIONS

After two weeks (10 days) of treatment procedure i.e.., TENS for GROUP A and PNF For GROUP B, both the groups showed a notable pain relief by using Visual Analogue Scale as an outcome measure. Though both the groups showed significant improvement under respective treatment procedure, but Group A (TENS) showed better improvement than Group B (PNF). This study concludes that individually both TENS & PNF are succesful in controlling pain. TENS is most effective modality for pain relief. As most often patients usually have an placebo effect. But making a firm conclusion is difficult because of limited data. There is a significant effect of TENS on pain than PNF in patients with acute cervical osteoarthritic pain.

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AUTHOR'S PROFILE

Dr RAJANI CARTOR MEDIDI PT, BPT, DHA, MPT, MIAP, Professor & Principal – VAPMS College of Physiotherapy, Visakhapatnam

Consultant Physiotherapist – VMC Polyclinic, Madhurwada, Visakhapatnam.

Dr Galla Bhagya Prasanna Devi PT, BPT, MPT, Consultant Physiotherapist – Apollo Hospitals, Visakhapatnam